CLAIMS

1. A method of creating multiple spanning trees within a computer network, each spanning tree defining a loop-free path among a plurality of intermediate devices within the network, the network configured with a plurality of virtual local area network (VLAN) designations, the method comprising the steps of:

receiving a plurality of multiple instance spanning tree protocol bridge protocol data unit (MI-STP BPDU) messages at one or more of the intermediate devices from remaining ones of the intermediate devices, each MI-STP BPDU containing a spanning tree instance identifier;

processing the received MI-STP BPDU messages at the one or more intermediate devices so as to define a loop-free path for each spanning tree instance identifier;

mapping each VLAN designation of the computer network to a spanning tree instance identifier; and

distributing messages tagged with a given VLAN designation across the loop-free path for the spanning tree instance identifier to which the given VLAN designation is mapped.

2. The method of claim 1 further comprising the step of configuring one or more intermediate devices with the spanning tree instance identifiers for the computer network.

3. The method of claim 1 further comprising the step of configuring one or more intermediate devices with the mapping of VLAN designations to spanning tree instance identifiers.

4. The method of claim 3 wherein the step of configuring is performed by a VLAN distribution protocol.

5. The method of claim 4 wherein the VLAN distribution protocol is the VLAN Trunk Protocol (VTP).

6. The method of claim 1 wherein the step of processing received MI-STP BPDU messages comprises the steps of:

electing a root device for each spanning tree instance;

identifying a root port at each intermediate device for each spanning tree instance, each root port providing a lowest cost path to the root device of the respective spanning tree instance;

identifying zero, one or more designated ports at each intermediate device for each spanning tree instance; and

transitioning the root port and each designated port for each spanning tree instance at the intermediate devices to a forwarding spanning tree port state.

7. The method of claim 6 further comprising the step of transitioning all non-root and non-designated ports for each spanning tree instance to a blocking spanning tree port state.

8. The method of claim 7 further comprising the step of, in response to receiving a conventional configuration BPDU message at a given intermediate device, forwarding the conventional configuration BPDU message from all designated ports of the intermediate device for a selected spanning tree instance.

9. The method of claim 1 wherein at least one MI-STP BPDU message for a given spanning tree instance has a VLAN mapping message unit that includes each VLAN designation mapped to the given spanning tree instance.

10. The method of claim 1 wherein each MI-STP BPDU message includes a destination service access point (DSAP) that contains a value other than the DSAP value specified in the IEEE 802.1D standard for configuration BPDU messages so that MI-STP BPDU messages received by legacy intermediate devices are dropped and not processed.

11. The method of claim 1 further comprising the step of blocking traffic associated with a VLAN designation that is mapped to more than one spanning tree instance.

12. The method of claim 1 further comprising the steps of waiting a preselected time before distributing messages tagged with a given VLAN designation to confirm that the VLAN mapping is correct.

13. The method of claim 12 wherein the VLAN mapping is considered correctly mapped provided that no MI-STP BPDUs are received within the preselected time that map the given VLAN designation to either a different spanning tree instance identifier or to no spanning tree instance identifier.

14. The method of claim 12 wherein the preselected time is a forward delay time specified in the MI-STP BPDU.

15. The method of claim 1 further comprising the step of tunneling un-tagged IEEE bridge protocol data unit (BPDU) messages utilizing the loop-free path of a preselected spanning tree instance identifier.

16. The method of claim 15 wherein the step of tunneling comprises the step of forwarding the IEEE BPDU message unmodified from each intermediate device port that is in the forwarding state for the preselected spanning tree instance identifier other than the port on which the IEEE BPDU message was received.

17. The method of claim 16 further comprising the steps of:

examining a topology change (TC) flag of IEEE BPDU messages received at a given intermediate device; and

for each spanning tree instance for which the given intermediate device is the root, setting a TC flag of the MI-STP BPDU messages sourced by the given intermediate device as the root.

18. The method of claim 15 further comprising the step of tunneling un-tagged IEEE Topology Change Notification (TCN) messages utilizing the loop-free path of the preselected spanning tree instance identifier.

19. The method of claim 1 further comprising the step of tunneling BPDU messages that are tagged with a given VLAN designation along the loop-free path established for the spanning tree instance to which the given VLAN designation is mapped.

20. The method of claim 19 further comprising the steps of:

examining a topology change (TC) flag of BPDU messages tagged with a VLAN designated and received at a given intermediate device; and

provided that the given intermediate device is the root for the spanning tree instance to which the VLAN of the BPDU message is mapped, setting a TC flag of the MI-STP BPDU messages sourced by the given intermediate device the spanning tree instance.

21. The method of claim 19 further comprising the step of tunneling IEEE Topology Change Notification (TCN) messages tagged with the given VLAN designation along the loop-free path established for the spanning tree instance to which the given VLAN designation is mapped.

22. An intermediate device for use in a computer network having a plurality of virtual local area network (VLAN) designations, the intermediate device comprising:

a plurality of ports for use in interconnecting the intermediate device to the computer network;

a spanning tree engine in communicating relationship with the plurality of ports, wherein the spanning tree engine is configured to:

generate and send from the plurality of ports one or more multiple instance spanning tree protocol bridge protocol data unit (MI-STP BPDU) messages, each MI-STP BPDU containing a spanning tree instance identifier; and

process received MI-STP BPDU message so as to cooperate in establishing a loop-free path for each spanning tree instance identifier; and

a VLAN association engine for mapping each VLAN designation to a spanning tree instance identifier so that messages tagged with a given VLAN designation may be forwarded along the loop-free path established for the spanning tree instance identifier to which the given VLAN designation is mapped.

23. The intermediate device of claim 22 further comprising at least one memory structure configured to store the mapping of VLAN designations to spanning tree instances.

24. The intermediate device of claim 23 further comprising a plurality of state machines, each state machine associated with a spanning tree instance and configured to transition the ports of the device among a plurality of spanning tree port states, including a blocking, a listening, a learning and a forwarding spanning tree port state, in response to the processing of received MI-STP BPDU messages by the spanning tree engine.

25. The intermediate device of claim 23 further comprising means for blocking messages tagged with a given VLAN designation upon determining that the given VLAN is mapped to zero or more than one spanning tree instance.

26. A computer readable medium containing executable program instructions for creating multiple spanning trees within a computer network, each spanning tree defining a loop-free path among a plurality of intermediate devices within the network, the network configured with a plurality of virtual local area network (VLAN) designations, the executable program instructions comprising steps for:

processing received multiple instance spanning tree protocol bridge protocol data unit (MI-STP BPDU) messages, each MI-STP BPDU containing a spanning tree instance identifier, so as to define a loop-free path for each spanning tree instance identifier;

mapping each VLAN designation of the computer network to a spanning tree instance identifier; and

distributing messages tagged with a given VLAN designation across the loop-free path for the spanning tree instance identifier to which the given VLAN designation is mapped.

27. An intermediate device for use in a computer network having a plurality of virtual local area network (VLAN) designations, the intermediate device comprising:

a plurality of ports for use in interconnecting the intermediate device to the computer network;

means for generating and sending from the plurality of ports one or more multiple instance spanning tree protocol bridge protocol data unit (MI-STP BPDU) messages, each MI-STP BPDU containing a spanning tree instance identifier;

means for processing received MI-STP BPDU message so to transition the ports among a plurality of spanning tree port states, including blocking, listening, learning and forwarding states, for each spanning tree instance;

means for mapping each VLAN designation to a spanning tree instance identifier; and

means for forwarding messages tagged with a given VLAN designation from ports in the forwarding spanning tree port state for the spanning tree instance to which the given VLAN designation is mapped.